Remarks:

Reconsideration of the application is requested.

Applicant acknowledges the Examiner's confirmation of receipt of the claim for priority and certified copy of the priority application under 35 U.S.C. § 119(a)-(d).

In the first paragraph on page 2 of the above-identified Office action, the drawings have been objected to. The Examiner's requirements for corrections are appreciated and have been made. Further, an additional drawing (Fig. 5) is enclosed. If the Examiner deems it to be appropriate, a description of Fig. 5, which contains no new matter, may be added to the instant application.

In the second paragraph on page 2 of the above-identified Office action, the disclosure has been objected to because of an alleged informality. Specifically, the Examiner stated that it is unclear as to what the term "magnet signal" refers to (at page 16, line 4). Applicant submits that "magnet signal" refers to a signal containing "minimum and maximum magnet values", as disclosed at page 16, line 7.

Claims 1-15 are now in the application.

In the fourth paragraph on page 2 of the above-identified Office action, claims 1-15 have been rejected as being nonenabling under 35 U.S.C. § 112, first paragraph.

In the second paragraph on page 3 of the above-identified Office action, claims 1-15 have been rejected as being indefinite under 35 U.S.C. § 112, second paragraph.

More particularly, the Examiner asserts that it is not clear from the description at pages 8-17:

1. a) what the modulation/demodulation circuit 10 includes;

b) what the sensor with intelligent circuit comprises;

c) what the voltage supply with a negative resistance characteristic comprises;

d) how the voltage supply and the sensor, structurally and functionally cooperate to carry out the various functions such as switching from the normal operation into the "test mode or communication mode", changing the behavior of the sensor and return to normal operation; and

e) how and where the modulated supply voltage is analyzed and interpreted.

Further, the Examiner is of the opinion that in claim 1 it is not clear:

- what the output signal and the successive pulses thereof represent;

- what the stored predetermined criterion is related to; and

- what an "external communication signal" represents.

As stated above, Applicant has included Fig. 5 and a description thereof below to provide additional explanation for "what the sensor with intelligent circuit comprises" (item 1b above):

The "intelligent circuit of the sensor in the embodiment of Fig. 1, which is described on page 9, line 19 to page 14, line 8, includes a circuit for recognizing the presence of a negative resistance of the modulating/demodulating circuit for a certain number of pulses to switch the sensor from the detection mode into the test mode or communication mode. See page 11, lines 9-11.

?

In the communication mode, the sensor behavior is changed over. See page 12, lines 8-15 of the specification of the instant application, which state:

"In this case, it is possible to convert internal analog signals, for example the (amplified) sensor input signal, into a current and to output the same in analog form. Furthermore, it is also possible, of course, to switch the data protocol into a specific communication mode and thus be able to transmit significantly more data than normal."

A circuit for recognizing the presence of a negative resistance and for switching the sensor from normal operation to test mode or communication mode is shown in the enclosed Fig. 5. The circuit of Fig. 5 uses the output signal of a comparator "volt_hi", which indicates the supply voltage level, Vi (volt_hi=HI corresponds to a high supply voltage $V_i$, and LO corresponds to a low supply voltage $V_i$). In addition, the circuit of Fig. 5 uses the output signal of the sensor "curr_hi", which corresponds to the sensor current, $I_s$, (curr_hi=HI corresponds to a high current, and LO to a low current). A negative resistance is present when "volt_hi" and "curr_hi" are both HI or both LO at the same time.

The circuit of Fig. 5 does not show the comparator, which distinguishes between the high and low levels of the supply

voltage Vi to provide a digital "volt_hi" with HI- and LO-levels. Preferably, the comparator includes a hysteresis, i.e., a forbidden gap between the high and low levels to detect large voltage changes.

The circuit of Fig. 5 checks whether or not the digital data generator operates with a negative resistance characteristic for a given number of "curr_hi" pulses. If so, the "open_out' signal is activated to switch the sensor from the normal operation to the test mode or communication mode. The check for the negative resistance is performed by the INV, NAND, OR and AND gates, which provide a HI-level to the reset-input of the counter when the resistance is negative and a LO-level to the reset-input of the counter when the resistance is positive. The other input of the counter (clock-input) is connected with the "curr_hi"-signal, which increments the counter from zero to five for each curr_hi" cycle as long as the reset-input of the counter is at HI-level. Once the counter has been incremented to "5", it activates the "open_out" signal to switch the sensor into the test or communication mode. Further, the counter remains at "5" until the reset-input is returned to LO-level due to a measured positive resistance at the input of the circuit of Fig. 5 (LO-level at the reset-input). When the reset-input returns to LO-level, the counter is reset to "0".

The shift register in Fig. 5 serves to mask possible time periods during which the processor of the digital data generator does not have time to initiate the correct "volt_hi" level (processor delay). Without the shift register, short "wrong" volt_hi/curr_hi signals (i.e., HI/LO or LO/HI) would interrupt each negative resistance pulse sequence and, accordingly, the output signal "open_out" would never be activated. To suppress the "wrong" volt_hi/curr_hi signals, the shift register of Fig. 1 generates on each pulse slope a short time window during which the NAND and OR gates are deactivated. Master clock signal "mcl" and slave clock signal "scl" serve to clock the shift register. If "wrong" signals are detected outside the short time window, the reset-input returns to LO-level, the counter is reset to zero and the "open-out" signal is deactivated. The same can be achieved with a central reset signal "rq" which resets the shift register and the counter.

Applicant disagrees with the opinion of the Examiner that above items 1a), 1c), 1d) and 1e) are not clear from the description for the following reasons:

<u>Re: 1a and 1c</u>

The description discloses that the modulation/demodulation circuit includes a "voltage supply, which has a <u>negative</u>

resistance characteristic". See page 10, lines 5-6. A person skilled in the art knows that a voltage supply with a negative resistance characteristic is a voltage supply that increases the voltage when the current consumption <u>increases</u>, and decreases the voltage when the current consumption <u>decreases</u>, as shown in Fig. 3B. Such behavior is in contrast to a voltage supply with a <u>positive</u> resistance characteristic (e.g., a battery), where the voltage <u>decreases</u> when the current consumption <u>increases</u> and vice versa. See Fig. 3A.

A voltage supply with a negative resistance characteristic can be realized in many ways, which are well known to a person skilled in the art. For example, a voltage supply with a negative resistance characteristic can be built from a standard power supply having a negative-impedance converter (NIC) in line with the voltage supply output. NICs have been known for a long time and are explained in a standard text book by P. Horowitz and W. Hill *"The Art of Electronics"*, Cambridge University Press, 1985, Chapter 4.03, "Negative Impedance Converters." A person skilled in the art would certainly know how to obtain and combine a NIC with a voltage supply.

Another way to realize the modulation/demodulation circuit according to the invention is to use a digital data generator, which supplies the sensor S with a high voltage in the case of

a high current consumption and with a low voltage in the case of a low current consumption. See *page* 11, lines 1-4 and Fig. 3B. The output signal of the sensor, which corresponds to the current consumption of the sensor is used to control the voltage switching of the digital data generator by setting the supply voltage Vi "to a high or low value". See *page* 15, lines 5-7. In the present invention, the digital data generator uses software and a processor to switch the voltage according to the current consumption of the sensor. Of course, the switching of the voltage by a processor is accompanied by some delay, which (for a short time) causes the data generator to be in a state of low voltage/high current or high voltage/low current. However, such states are ignored by the evaluation circuit of the sensor.

The realization of such a modulation/demodulation circuit, too, is clear to a person skilled in the art, in view of Fig. 3B and the description thereof. Applicant, therefore, is of the opinion that a person skilled in the art would be enabled by the description, including Fig. 1, Fig. 2, Fig. 3A and Fig. 3B, to make and/or use a modulation/demodulation circuit.

<u>Re: 1d</u>:

Figs. 1 and 2, with the timing diagrams of Figs. 3A, 3B, and Figs. 4A, 4B, and 4C, disclose how the voltage supply and the

sensor structurally and functionally cooperate to carry out the various functions, such as switching from normal operation into the "test mode or communication mode", changing the behavior of the sensor and returning to normal operation.

For example, <u>without</u> activation of the modulation/demodulation circuit 10 (i.e, in the detection mode), the supply voltage Vi <u>decreases</u> when the current consumption of the rotational sensor S increases. See Fig. 3A. In this mode, the supply voltage Vi is provided by the battery voltage Vbat, which has a positive resistance characteristic at the output.

In contrast, <u>with</u> activation of the modulation/demodulation circuit 10, the supply voltage Vi <u>increases</u> when the current consumption of the rotational sensor S increases. See Fig. 3B. In this case, "if the intelligent circuit of the sensor S then recognizes this state without interrupting for a certain number of pulses (or a certain time), then the sensor switches into the test mode or communication mode". *See* page 11, lines 9-13.

Further, "if the communication mode has been attained, then the sensor behavior has to be changed over". *See* page 12, lines 8-10. Several examples are given in the description as to in what sense the sensor behavior has to be changed over. See for instance ("outputting analog current signals") page

12, lines 11-12, or (changing over into a communication mode "to transmit significantly more data than normal) page 12, lines 13-15.

Further, in order to return to the normal operation, several options are available (e.g., software reset, switch off and on of operation voltage). See page 13, lines 8-15.

A more detailed disclosure about how to switch "from normal operation into the test mode, or communication mode, changing the behavior and return to normal operation" is given in Figs. 4A-4C and the description at page 14, line 10 to page 16, line 4.

Applicant, therefore, believes that the current description provides sufficient information to enable a person skilled in the art to understand how the voltage supply and the sensor structurally and functionally cooperate to carry out the various functions, such as switching from normal operation into the test mode or communication mode, changing the behavior and return to normal operation.

The modulated supply voltage of the circuit (shown in Figs. 1-2) is analyzed and interpreted by the sensor. This is implied, for example, by the statement of page 11, lines 9-12 saying that "[i]f the intelligent circuit of the sensor S

[...] recognizes this state [...] then the sensor switches into test mode or communication mode." The term "recognize" represents the two steps of analyzing and interpreting the modulated supply voltage, as described in item 1b.

*Moreover*, Applicant disagrees with the Examiner's statement that claim 1 is not clear as explained below:

Applicant believes that the element "output signal with successive signal pulses" of claim 1 is self-explanatory. It represents the signal that a sensor has to output in order to receive information on what the sensor has sensed. For example, in Fig. 1, the output signal is represented by the detection voltage VR, which is proportional to the sensor current. See page 9, line 1. In Fig. 2, the output signal is represented by the voltage VS on the detection line LS. See page 9, line 11. In one embodiment of the invention, the output signals are "successive logic L and H signal pulses". See page 10, lines 10-11.

The stored predetermined criterion of claim 1 is a criterion according to which the modulated supply voltage is analyzed by the sensor. The predetermined criterion serves to interpret external modulations of the supply voltage on the supply line as an external communication signal. See page 16, line 25 to page 17, line 4. For example, the predetermined criterion may

be whether the modulated supply voltage behaves like a negative resistance supply voltage or not (i.e., whether "*a phase shift by $0^0$ between sensor current $I_s$ and sensor voltage* $V_s$" is provided or not. See page 11, lines 4-7 and Fig. 3B).

The "external communication signal" according to the invention refers to the ability to externally communicate with the sensor by the voltage supply lines. This allows signaling to the sensor the desire for a test mode or communication in a situation where "only the supply lines of the[ ....] sensor are freely accessible after the latter has been built in". See page 2, lines 19-21. Enclosed Fig. 5 shows an example of a circuit, which interprets voltage supply pulses that are in $0^0$ phase with the sensor current, as an external communication signal that prompts the sensor to switch into the test or communication mode.

Further examples of external communications with the sensor by the interpretation of the received modulated supply voltage Vi are described, for example, in Fig. 4A, where data words DWI, DW2 and DW3 are transmitted during the communication mode. See also page 15, lines 8-10. Figs. 4B and 4C show details of the data word transmission. See also page 15, lines 14-24. The data word transfer techniques shown in Figs. 4A, 4B and 4C can be used to obtain unlimited access to the communication interface of the sensor module. See also page 16, lines 1-3.

It is accordingly believed that the claims meet the requirements of 35 U.S.C. § 112, first and second paragraphs. The above-remarks are provided solely for the purpose of explaining the present invention. They are neither provided for overcoming the prior art nor do they narrow the scope of the claim for any reason related to the statutory requirements for a patent.

In view of the foregoing, reconsideration and allowance of claims 1-15 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, the Examiner is respectfully requested to telephone counsel so that, if possible, patentable language can be worked out.

Petition for extension is herewith made. The extension fee for response within a period of two months pursuant to Section 1.136(a) in the amount of $400.00 in accordance with Section 1.17 is enclosed herewith.

Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and

Greenberg, P.A., No. 12-1099.

Respectfully submitted,

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For Applicant

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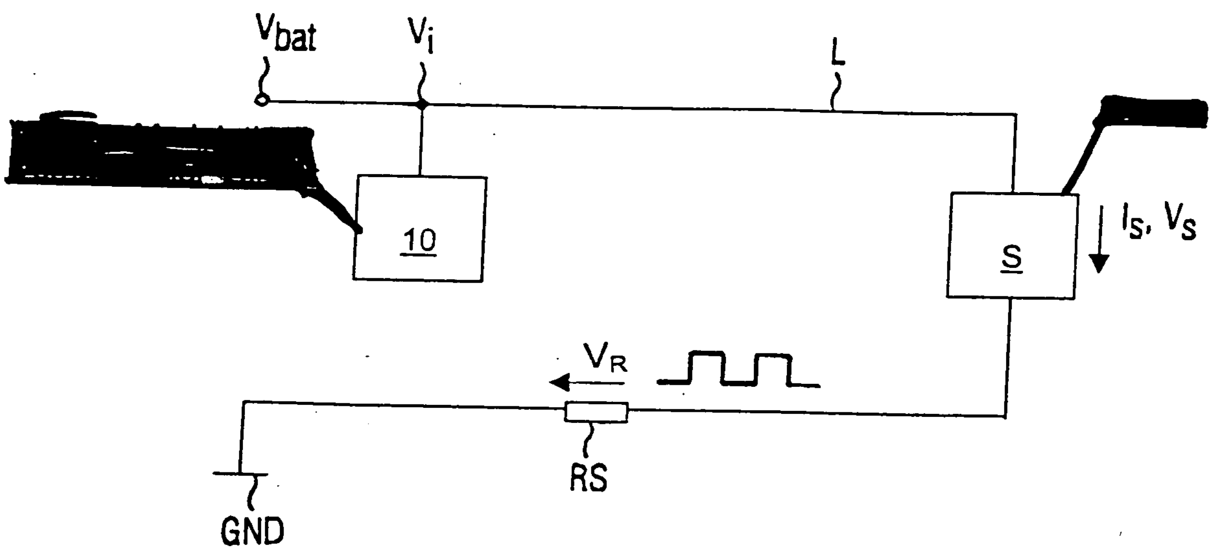
PRIOR ART

FIG 1




PRIOR ART

FIG 2